

REMARKS

This Amendment is in response to the Office Action mailed on November 14, 2002.

Claims 1 through 34 are currently pending in the application.

Claims 9-17 and 26-34 have been withdrawn from consideration as being directed to a non-elected invention.

Applicants have amended herein claims 1, 4, 18, and 21 and respectfully request reconsideration of the above-referenced application.

Abstract

The Office requested that the abstract of the disclosure be revised to read on method inventions according to MPEP §608.01(b). Applicants have amended the abstract of the disclosure to comply with the Office's request.

Drawings

The Drawings were objected to under 37 C.F.R. §1.83(a) because an assertion was made that they fail to show "stencil plate areas" as described in claims 5 and 22. Applicants believe that the Office meant claims 4 and 21 because these are the claims reciting "stencil plate areas." Applicants respectfully submit that the amendments submitted herein to claims 4 and 21 are clearly supported by FIG. 4 and the disclosure of the above-referenced application. Therefore, Applicants request that this objection be reconsidered.

35 U.S.C. § 112 Claim Rejection

Claims 1 through 8 and 18 through 25 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Applicants have amended claims 1, 4, 18, and 21 and reviewed claims 3, 5 through 7, 19, 20, and 22 through 25 for the problems identified in the Office Action. Applicants submit that these rejections have been overcome in this amendment.

As to the confusion with “apparatus,” “substrate,” and “a plurality of conductive spheres” in claims 1 and 18, Applicants respectfully submit that the presently amended to claims 1 and 18 to comply with 35 U.S.C. § 112, second paragraph.

As to the rejection based on the phrase “the first pattern are greater than the diameter of said spheres by up to 1 mm” being indefinite and confusing (Office Action, page 3, lines 10-14) because “applicants need to be specific because it is not clear as to exactly associated element in which the diameter is greater than the diameter of each sphere” (*Id.*), Applicants respectfully submit that the language recited in claims 5 and 22 is not confusing. Claims 5 and 22 recite “wherein the diameters of said through-holes of said first pattern are greater than the diameters of said plurality of spheres by up to 1 mm.” Such language is clear and recites that the diameter of the through-holes in the first pattern of the stencil is greater than the diameter of the spheres by up to 1 mm.

Applicants submit that presently amended claims 1 through 8 and 18 through 25 are allowable under the provisions of 35 U.S.C. §112. Second paragraph.

35 U.S.C. § 102(b) Anticipation Rejection

Claims 1 through 4, 6 through 8, 18 through 21, and 23 through 25 were rejected under 35 U.S.C. §102(b) as being anticipated by Kirby et al. (U.S. Patent 5,431,332, hereinafter “Kirby”).

Applicants submit that a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Kirby describes a method and apparatus for attaching and removing solder spheres from a substrate assembly. A pallet 4 is lifted and located or aligned below a stencil 16 and a bin/dispenser 26 bulk pours solder spheres 30 onto the stencil 16 having the array of apertures 18. A frame 14 serves to corral the solder spheres within the confines of the top surface area of the stencil 16. A vibrator 20 is turned on for several seconds to urge the solder spheres into the

array of apertures 18. The vibrator 20 is then turned off and a brush 35 makes an initial sweeping of the solder spheres towards the bin 26. A directed column of air built into the back wall of the frame serves to initially sweep the excess solder balls 30 towards the reservoir 26. Next, a pneumatic slide 22 moves a directed column of air 24, literally air brushing or plowing the excess solder balls 30 off the surface of the stencil 16 towards the reservoir 26. Stencil apertures having a diameter of 0.023" are disclosed as ideally suited for 0.020" diameter solder balls (Kirby, col. 2, line 46 – col. 3, line 47).

Applicants respectfully submit that Kirby does not anticipate the presently claimed invention under 35 U.S.C. § 102 amended independent claims 1 and 18 because each and every element as set forth therein is not found, either expressly or inherently described, in Kirby. In particular, among other recited elements, Kirby does not describe "a hopper extending across at least a portion of the upper surface of a stencil plate and closely spaced therefrom to maintain control over all said spheres therein . . . the hopper being configured such that, as it moves across a portion of the upper surface, only spheres dropping into the plurality of through-holes can escape from the hopper" (claims 1 and 18, emphasis added).

Kirby's bin or dispenser of solder balls bulk pours the spheres on top of the stencil surface such that the dispensed spheres are corralled with the confines of the top surface area of the stencil. The movement and positioning of the solder balls are not carried on, induced, and/or controlled by the bin or dispenser, but with the use of a vibrator. In addition, because so many extra solder balls are dropped unnecessarily, Kirby requires the use of a brush, a column of air, and finally a directed column of air driven by a pneumatic slide in order to remove or sweep the unwanted solder balls from the stencil surface back to the bin or dispenser. In the present invention, as recited in the presently amended claims 1 and 18, only the spheres dropping in the through-holes are allowed to leave the hopper because of the close proximity of hopper to the stencil surface. In addition, the placement and movement of these spheres are accomplished by the displacement of the hopper apparatus alone without the use of brushes, air columns, or a column of air drive by a pneumatic slide.

Additionally, claims 2 through 4 and 6-8, and 19 through 21 and 23 through 25, are each allowed, among other reasons, as depending either directly or indirectly from claims 1, and 18, respectively, which are allowable.

Therefore, Applicants respectfully request that the allowance of claims 1 through 4, 6 through 8, 18 through 21, and 23 through 25.

35 U.S.C. § 103(a) Obviousness Rejection

Claims 5 and 22 were rejected under 35 U.S.C. §103(a) as being unpatentable over Kirby.

Applicants submit that to establish a *prima facie* case of obviousness under 35 U.S.C. §103 three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the cited prior art reference must teach or suggest all of the claim limitations. Furthermore, the suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicants' disclosure.

Applicants respectfully submit that regarding claims 5 and 22 Kirby does not and cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 because the cited prior art reference does not teach or suggest all of the limitations of claims 5 and 22. Claims 5 and 22 are dependent from independent claims 1 and 18 and thus include all of the limitations recited therein. As discussed hereinabove, Kirby does not teach or suggest or describe several of the recited elements of the presently amended independent claims 1 and 18; therefore, Kirby could not and cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 claims 1 and 18. For that reason, regarding claims 5 and 22, Kirby, does not teach or disclose all of the limitations recited in claims 1 and 18 to establish a *prima facie* case of obviousness under 35 U.S.C. § 103.

In addition, the diameters of solder balls and apertures recited by Kirby cannot and does not establish the claim limitations of claims 5 and 22, i.e., "the diameters of said through-holes of

For at least the above-discussed reasons, Applicants respectfully request the allowance of claims 5 and 22.

CONCLUSION

Claims 1 through 8 and 18 through 25 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,



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Enclosure: Version with Markings to Show Changes Made

Document in ProLaw

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE ABSTRACT:

A marked-up version of the amended Abstract, highlighting the changes thereto, follows to clearly identify the amendments:

[Apparatus and] [m]Methods for placing conductive spheres on prefluxed bond pads of a substrate using a stencil plate with a pattern of through-holes positioned over the bond pads. Conductive spheres are placed in the through-holes by a moving feed mechanism and the spheres drop through the through-holes onto the bond pads. In one embodiment, the feed mechanism is a sphere hopper which crosses the entire through-hole pattern. In another embodiment, a shuttle plate fed spheres from a reservoir and reversibly moves about one-half of the pitch, moving from a non-discharge position to a discharge position.

IN THE CLAIMS:

A marked-up version of each of the presently amended claims, highlighting the changes thereto, follows:

1. (Amended) An apparatus for placing a plurality of conductive spheres on a substrate, comprising:

a stencil plate with upper and lower surfaces, [and] a first pattern of a plurality of through-holes, and a second pattern having no through-holes, said stencil plate configured to place [a] said plurality of conductive spheres in said first pattern on a proximate surface of [a] said substrate;

a hopper extending across at least a portion of said upper surface of said stencil plate and [proximate thereto] closely spaced therefrom to maintain control over all said spheres therein, said hopper having a bottom opening with a dimension extending across said first pattern for dispensing said spheres into [the] said plurality of through-holes of said stencil plate, and being configured such that, as said hopper moves across said portion of said upper surface, only said spheres dropping into said plurality of through-holes can escape from said hopper; and

a positioning apparatus for moving said hopper over said first pattern relative said stencil plate to place said spheres into said plurality of through-holes and thereby onto said proximate surface of said substrate.

4. (Amended) The apparatus of claim 1, wherein said apparatus for moving said hopper is configured to move said hopper to a portion of said upper surface containing said second pattern located on [between stencil plate areas on] opposed sides of said [second] first

18. (Amended) An apparatus for positioning a plurality of conductive spheres on a substrate, each conductive sphere of said plurality of conductive spheres having a diameter, said apparatus comprising:

a stencil plate having an upper surface, having a lower surface, [and] having a first pattern of a plurality of through-holes, and a second pattern having no through-holes, each through-hole having a diameter, said stencil plate configured to position [a] said plurality of conductive spheres in said first pattern on a proximate surface of [a] said substrate;

a hopper extending across at least a portion of said upper surface of said stencil plate [and proximate thereto] closely spaced therefrom to maintain control over all said spheres therein, said hopper having a bottom opening with a dimension extending across said first pattern for dispensing said spheres into [the] said plurality of through-holes of said first pattern of said stencil plate, and being configured such that, as said hopper moves across said portion of said upper surface, only said spheres dropping into said plurality of through-holes can escape from said hopper; and

a positioning apparatus for moving said hopper over said first pattern relative of said stencil plate to position said spheres into said plurality of through-holes and thereby onto said proximate surface of said substrate.

21. (Amended) The apparatus of claim 18, wherein said apparatus for moving said hopper is configured to move said hopper to a portion of said upper surface containing said second pattern located on [between stencil plate areas on] opposed sides of said [second] first pattern[, said stencil plate areas having no through-holes].